

**HAZARD RANKING SYSTEM DOCUMENTATION PACKAGE
DIAMOND HEAD OIL REFINERY DIV.
KEARNY, HUDSON COUNTY, NEW JERSEY**

CERCLIS ID No.: NJD092226000

VOLUME 1 of 1

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Prepared for:
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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SITE SUMMARY

The Diamond Head Oil Refinery Div. (Diamond Head) site is located at 1401 Harrison Ave. in Kearny, Hudson County, New Jersey. Currently, the site is inactive and consists of approximately 15 acres of undeveloped land that is bordered by Harrison Avenue to the north, entrance ramp M of Interstate 280 (I-280) to the east, I-280 to the south, and Campbell Distribution Foundry to the west. The site is comprised of wetland areas and drainage ditches, a small wetland/pond, a vegetated landfill area along the western border of the site, and the remnants of the former Diamond Head Oil Refinery on the eastern portion of the site. The abandoned refinery portion of the site contains various construction debris, including foundations of the former on-site building and two former aboveground storage tanks. The site is currently owned by the Hudson Meadows Urban Development Corporation (HMURDC).

The site was in operation from February 1, 1946 to early 1979. The facility operated under several company names including PSC Resources, Inc., Ag-Met Oil Service, Inc., and Newtown Refining Corporation. All of these companies were owned by Mr. Robert Mahler. In January 1985, Newtown Refining Corporation sold the property to Mimi Urban Development Corporation, which changed its name to Hudson Meadows Urban Development Corporation.

During facility operations, two aboveground storage tanks (conflicting reports of volumes of 30,000 and 100,000 gallons) and possibly underground pits were used to store oily wastes. These wastes were intermittently discharged directly to adjacent properties, including the wetland area to the south of the site, creating an oil lake. The New Jersey Department of Transportation (NJDOT) acquired the property south of the site on March 6, 1968. In 1977, NJDOT began construction of I-280 and was reported to have removed 9 million gallons of oil-contaminated water and 5 to 6 million cubic yards of oily sludge from the lake. The material was reportedly transported to Newtown Refining Corporation's facility on Long Island to be recycled; however, there are no reports stating that this recycling process occurred. It is also reported that during the construction of I-280, an underground lake of oil-contaminated groundwater was found extending from the eastern limits of the NJDOT right-of-way to Frank's Creek on the west. It is reported that, prior to abandoning the site, Diamond Head cleaned out the two aboveground tanks; however, there is no known documentation of this activity. From the close of operations in 1979 until 1982, the abandoned site was not completely fenced. During this time, it was reported that dumping of waste oils and other debris took place on site. A contractor was hired to clean up the site in May 1982. In order to do so, the material in the tanks was analyzed and found to contain polychlorinated biphenyls (PCBs) at a concentration of 206 parts per million (ppm). Subsequent analyses revealed the presence of PCBs at concentrations over 3,100 ppm. Approximately 7,500 gallons of material were reportedly pumped out of the tanks and disposed off site by a Resource Conservation and Recovery Act (RCRA) permitted Treatment, Storage, and Disposal Facility (TSDF). In addition, 27 tons of contaminated soil were reportedly removed from the site in May 1982.

Background information indicates that previous investigations have been conducted at the Diamond Head Oil Refinery Div. site. These investigations include a sampling event conducted by the New Jersey Department of Environmental Protection (NJDEP), an Environmental Site Characterization conducted by a contractor hired by HMURDC, and a Site Inspection conducted by the U.S. Environmental Protection Agency (EPA) Region II Field Investigation Team (FIT). During these investigations, groundwater, surface water/sediment, surface/subsurface soil, liquid waste and solid waste samples were collected. Analytical results of these samples indicated the presence of volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs), pesticides, PCBs, and metals.

In December 1999 EPA conducted an Expanded Site Inspection (ESI) at the Diamond Head Oil Refinery Div. site. During the ESI, EPA collected surface/subsurface soil and ground water samples from 20 borings advanced throughout the site. EPA

also collected sediment samples from the on-site wetland/pond area as well as from the wetland area extending along the southern perimeter of the site. Analytical results indicated the presence of VOCs, SVOCs, pesticides, PCBs, and metals.

An observed release to surface water is documented by chemical analyses of sediment samples collected from wetlands along the southern and western boundaries of the site. Level II concentrations of lead, mercury, and zinc are documented to 0.20 mile of wetland frontage extending along the southern and western boundaries of the site.

HRS DOCUMENTATION RECORD--REVIEW COVER SHEET

Name of Site: Diamond Head Oil Refinery Div.

Contact Persons

Site Investigation: Dennis J. Foerter (732) 225-6116
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Edison, NJ

Documentation Record: Dennis Munhall (212) 637-4343
U.S. Environmental Protection Agency
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Dennis J. Foerter (732) 225-6116
Roy F. Weston, Inc. - Region II START
Edison, NJ

Pathways, Components, or Threats Not Scored

The Ground Water, Soil Exposure, and Air Pathways were not scored because the site score would not be significantly impacted by those pathways.

HRS DOCUMENTATION RECORD

Name of Site: Diamond Head Oil Refinery Div.

EPA Region: 2

Date Prepared: May 2000

Street Address of Site: 1401 Harrison Turnpike, Kearny

County and State: Hudson, NJ

General Location in the State: northern NJ

Topographic Map: Elizabeth, NJ (Ref. 5)

Latitude: 40° 44' 50.0" North

Longitude: 74° 07' 55.9" West

(Ref. 4)

EPA ID No.: NJD092226000

Scores

Ground Water Pathway	Not Scored
Surface Water Pathway	60.00
Soil Exposure Pathway	Not Scored
Air Pathway	Not Scored

HRS SITE SCORE 30.00

WORKSHEET FOR COMPUTING HRS SITE SCORE

	<u>S</u>	<u>S²</u>
1. Ground Water Migration Pathway Score (S_{gw}) (from Table 3-1, line 13)	<u>Not Scored</u>	
2a. Surface Water Overland/Flood Migration Component (from Table 4-1, line 30)	<u>60.00</u>	<u>3,600</u>
2b. Ground Water to Surface Water Migration Component (from Table 4-25, line 28)	<u>Not Scored</u>	
2c. Surface Water Migration Pathway Score (S_{sw}) Enter the larger of lines 2a and 2b as the pathway score.	<u>60.00</u>	<u>3,600</u>
3. Soil Exposure Pathway Score (S_s) (from Table 5-1, line 22)	<u>Not Scored</u>	
4. Air Migration Pathway Score (S_a) (from Table 6-1, line 12)	<u>Not Scored</u>	
5. Total of $S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$		<u>3,600</u>
6. HRS Site Score Divide the value on line 5 by 4 and take the square root	<u>30.00</u>	

PREScore 4.1
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors DRINKING WATER THREAT	Maximum Value	Value Assigned
Likelihood of Release		
1. Observed Release	550	550
2. Potential to Release by Overland Flow		
2a. Containment	10	
2b. Runoff	25	
2c. Distance to Surface Water	25	
2d. Potential to Release by Overland Flow [(lines 2a(2b+2c))]	500	
3. Potential to Release by Flood		
3a. Containment (Flood)	10	0
3b. Flood Frequency	50	0
3c. Potential to Release by Flood (lines 3a x 3b)	500	0
4. Potential to Release (lines 2d+3c)	500	
5. Likelihood of Release	550	550
Waste Characteristics		
6. Toxicity/Persistence	*	0
7. Hazardous Waste Quantity	*	0
8. Waste Characteristics	100	0
Targets		
9. Nearest Intake	50	0.00E+00
10. Population		
10a. Level I Concentrations	**	0.00E+00
10b. Level II Concentrations	**	0.00E+00
10c. Potential Contamination	**	0.00E+00
10d. Population (lines 10a+10b+10c)	**	0.00E+00
11. Resources	5	0.00E+00
12. Targets (lines 9+10d+11)	**	0.00E+00
13. DRINKING WATER THREAT SCORE	100	0.00

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

PREScore 4.1
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors HUMAN FOOD CHAIN THREAT	Maximum Value	Value Assigned
Likelihood of Release		
14. Likelihood of Release (same as line 5)	550	550
Waste Characteristics		
15. Toxicity/Persistence/Bioaccumulation	*	0
16. Hazardous Waste Quantity	*	0
17. Waste Characteristics	1000	0
Targets		
18. Food Chain Individual	50	0.00E+00
19. Population		
19a.Level I Concentrations	**	0.00E+00
19b.Level II Concentrations	**	0.00E+00
19c.Pot. Human Food Chain Contamination	**	0.00E+00
19d.Population (lines 19a+19b+19c)	**	0.00E+00
20. Targets (lines 18+19d)	**	0.00E+00
21. HUMAN FOOD CHAIN THREAT SCORE	100	0.00

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

PREScore 4.1
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors ENVIRONMENTAL THREAT	Maximum Value	Value Assigned
Likelihood of Release		
22. Likelihood of Release (same as line 5)	550	550
Waste Characteristics		
23. Ecosystem Toxicity/Persistence/Bioacc.	*	5.00E+08
24. Hazardous Waste Quantity	*	1.00E+06
25. Waste Characteristics	1000	1000
Targets		
26. Sensitive Environments		
26a. Level I Concentrations	**	0.00E+00
26b. Level II Concentrations	**	2.50E+01
26c. Potential Contamination	**	2.50E+00
26d. Sensitive Environments	**	2.75E+01
(lines 26a+26b+26c)		
27. Targets (line 26d)	**	2.75E+01
28. ENVIRONMENTAL THREAT SCORE	60	60.00
29. WATERSHED SCORE	100	60.00
30. SW:OVERLAND/FLOOD COMPONENT SCORE (Sof)	100	60.00

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

REFERENCES

Reference Number	<u>Description of the Reference</u>
1.	U.S. Environmental Protection Agency (USEPA), <u>Revised Hazard Ranking System, Final Rule</u> , 55 FR 51532, December 14, 1990. [9 pp.]
2.	U.S. EPA, <u>Superfund Chemical Data Matrix, SCDM Data Version: JUN96</u> . [8 pp.]
3.	Foerter, D., Region II Superfund Technical Assessment and Response Team (START), <u>Project Note to Diamond Head Oil Refinery Div. File, Subject: Latitude and Longitude Calculations</u> , May 25, 2000. [1 p. and 1 topographic map]
4.	Halliburton NUS Environmental Corporation, <u>Final Draft Site Inspection Report, Diamond Head Oil Refinery Div., Kearny, New Jersey (excluding attachments)</u> , December 31, 1991. [42 pp.]
5.	Germine, Thomas J. Deputy Attorney General, State of New Jersey, Department of Law and Public Safety, <u>Memorandum of Meeting</u> , August 17, 1979. [4 pp.]
6.	Allen, H., Region II START, <u>Project Note to Diamond Head Oil Refinery Div. File, Subject: Calculation of the Total Area of the Former Oil Lake at the Diamond Head Oil Site</u> , June 15, 2000. [5 pp.]
7.	Trotter, J., Region II ESAT/RSCC, <u>Record of Communication to Smita Sumbaly, Subject: Quality Assured Data, Diamond Head Oil Refinery, Case 27633, (includes inorganic laboratory data)</u> , 10 February, 2000. [164 pp.]
8.	U.S. EPA, <u>Functional Guidelines for Evaluating Organic Analysis, Case No. 27633, Diamond Head Oil Refinery (includes organic laboratory data)</u> , 10 March 2000. [292 pp.]
9.	Nova Consultants, <u>Report for Harbor Consultants, To Conduct a Non-Tidal Wetland Delineation on a Tract Designated as: Block 294, Lots 3, 14, and 15, Kearny, NJ</u> , September 1990 [42 pp. and 1 map]
10.	EPA, Office of Emergency and Remedial Response, <u>Quick Reference Fact Sheet, Using Qualified Data to Document an Observed Release and Observed Contamination, EPA 540-F-94-028, OSWER 9285.7-14FS, PB94-963311</u> , November 1996. [18 pp.]
11.	Roy F. Weston, Inc., Region II START, <u>ESI Field Logbook - Diamond Head Oil Refinery Div., Document Control No. START-02-423</u> , October-December 1999. [17 pp.]

REFERENCES (cont'd)

<u>Reference Number</u>	<u>Description of the Reference</u>
12.	Foerter, D., Region II START, <u>Project Note to Diamond Head Oil Refinery Div. File, Subject: Observations of Oil Discharge and Oil Stained Soil at Diamond Head Oil</u> , May 30, 2000. [4 pp.]
13.	Foerter, D., Region II START, <u>Project Note to Diamond Head Oil Refinery Div. File, Subject: Non-Contaminated Portion of Wetland C</u> , June 16, 2000. [2 pp.]
14.	Foerter, D., Region II START, <u>Project Note to Diamond Head Oil Refinery Div. File, Subject: Analytical Data/Sample Quantitation Limits (Diamond Head Oil Refinery)</u> , June 16, 2000. [8 pp.]
15.	Foerter, D., Region II START, <u>Project Note to Diamond Head Oil Refinery Div. File, Subject: Background ESI Sediment Samples</u> , December 6, 1999. [1 p.]

SOURCE DESCRIPTION

2.2 Source Characterization

Number of the source: 1

Name and description of the source: Surface impoundment (buried/backfilled)

Source 1 consists of a former surface impoundment which is also referred to as the oil lake. Background information indicates that oily wastes were discharged directly to adjacent properties (including the wetland area in the southern portion of the site) forming the oil lake (Ref. 4, p. 5). The New Jersey Department of Transportation (NJDOT) acquired the property adjacent to the site in 1968. In 1977, NJDOT began construction of Interstate 280 and reportedly pumped approximately 9 million gallons of oil and oil/water emulsion from the lake. In addition, approximately 5 to 6 million cubic yards of oil sludge were removed from the lake by mudwaving and backfilling with compressed sand (Ref. 4, p. 5; 5, p. 2).

Analytical results of the oil lake's oil layer indicated 32 percent oil and 68 percent water and sediment. In addition, the sample indicated a high lead and zinc content (Ref. 5, p. 3). In addition, soil/sediment samples collected from Wetland A during the 1991 SI indicated the presence of VOCs (Ref. 4, pp. 16, 17).

During ESI activities conducted by EPA in December 1999, petroleum odors, oil saturated soil, and free product were observed in several borings advanced in the area of the former oil lake (Ref. 11, pp. 13, 14, Figure 3).

A review of aerial photographs indicate that the area of the on-site pond/wetland (wetland A) was a part of the oil lake surface impoundment (Ref. 6, p. 5). Based on the fact that this area was an isolated water body and was intended to be used as a waste management area, and the fact that hazardous substances in the pond were the result of deposition, the on-site pond is evaluated as part of the oil lake surface impoundment.

The oil lake is not excluded as a source at the site due to the fact that contaminants not associated with petroleum products (i.e., PCBs, chlorinated solvents) were detected in samples collected from the oil lake. In addition, the oil lake consists of waste oils and is not the result of a petroleum product spill (Ref. 5; 12).

Location of the source, with reference to a map of the site:

The former oil lake was located in the southeast portion of the site and extended off site to the south and east (see Figure 3). A portion of the oil lake appears to have existed in the area of Wetland A, which is an on-site palustrine wetland (Wetland A) located in the southeast portion of the site (Ref. 6, p. 5; Figure 3).

Containment

Release via overland migration and/or flood:

Based on the fact that there are no containment features associated with source 1, the containment factor for the surface water migration pathway is 10 (Ref. 1, p. 51610).

2.4.1 Hazardous Substances

<u>Hazardous substance</u>	<u>Evidence</u>	<u>Reference</u>
Lead (max. = 84,300J mg/kg SD04)	ESI Sampling Event* December 1999: SD04, SD05, SD06, SD08, SD09, SD10, SD11, SD12, SD13, SD14, SD15	7, pp. 54-56
Zinc (max. = 17,700J mg/kg SD04)	ESI Sampling Event* December 1999: SD04, SD05	7, p. 54
PCBs (max. = 13.0 D mg/kg SD10)	ESI Sampling Event* December 1999: SD05, SD06, SD07, SD10, SD11, SD12, SD13, SD14	8, pp. 67-75
Mercury (max. = 3.9 mg/kg SD08)	ESI Sampling Event* December 1999: SD08, SD11, SD13, SD14, SD15	7, pp. 54-56
Tetrachloroethylene (max.= 25,000E ug/kg S10)	SI Sampling Event (1991): S10	4, pp. 16, 17
1,1,1-trichloroethane (max.= 3,200E ug/kg SD10)	SI Sampling Event (1991): S10	4, pp. 16, 17

* ESI Sample locations are provided in Figure 3.

Notes: J or E qualifiers indicate an estimated value. D qualifiers indicate that a dilution was performed prior to analysis.

2.4.2 Hazardous Waste Quantity

2.4.2.1.1 Hazardous Constituent Quantity

The information available is not sufficient to evaluate Tier A source hazardous waste quantity.

Hazardous Constituent Quantity Value (S): N/A

2.4.2.1.2 Hazardous Wastestream Quantity

The information available is not sufficient to evaluate Tier B source hazardous waste quantity.

Hazardous Wastestream Quantity (W): N/A

Hazardous Wastestream Quantity Assigned Value: N/A

2.4.2.1.3 Volume

Prior to removal activities conducted by NJDOT, the oil lake consisted of 9 million gallons of oil and oil/water emulsion, and approximately 5 to 6 million cubic yards of oil sludge (Ref. 4, p. 5; 5, p. 2). During ESI sampling activities, petroleum odors, oil saturated soil, and free product were observed in borings advanced in the area of the former oil lake (Ref. 11, pp. 13, 14). Based on this information, the following hazardous waste calculations are made:

1 cubic yard = 200 gallons; therefore,
9 million gallons/200 gallons = 45,000 cubic yards

5 million cubic yards of oil sludge + 45,000 cubic yards = 5,045,000

Based on this information the volume of the oil lake was 5,045,000 cubic yards. The source type is a surface impoundment (buried/backfilled), so the equation for assigning hazardous waste value is V/2.5, according to Table 2-5 of the HRS rule (Ref. 1, p. 51591). This results in a value of 2,018,000.

Dimension of source (yd³): 5,045,000

Reference(s): 1, p. 51591

Volume Assigned Value: 5,045,000 / 2.5 = 2,018,000

2.4.2.1.4 Area

Since the volume of the waste source can be determined, a value of 0 is given for area measurement (Ref. 1, p.51591). It should be noted that an aerial photograph from 1976 indicates that the area of the oil lake was approximately 4 acres (Ref. 6, pp. 1-4).

Area of source (ft²): Not evaluated

Reference(s): 1, p. 51591

Area Assigned Value: 0

2.4.2.1.5 Source Hazardous Waste Quantity Value

Prior to removal activities conducted by NJDOT, the oil lake consisted of 9 million gallons of oil and oil/water emulsion, and approximately 5 to 6 million cubic yards of oil sludge (Ref. 4, p. 5; 5, p. 2). During ESI sampling activities, petroleum odors, oil saturated soil, and free product were observed in borings advanced in the area of the former oil lake (Ref. 11, pp. 13, 14). Based on this information, and the volume calculation made in section 2.4.2.1.3, a hazardous waste quantity value of 2,018,000 is assigned for the oil lake.

Source Hazardous Waste Quantity Value: 2,018,000

SOURCE DESCRIPTION

2.2 Source Characterization

Number of the source: 2

Name and description of the source: Contaminated Soil

Source 2 consists of contaminated soil. Inspections conducted by the New Jersey Department of Environmental Protection in the 1970s and 1980s noted discharges of oil to the surface in the area of the former building and tanks, as well as in the western property boundary adjacent to the right-of-way. Oil-stained soil was also noted in several locations throughout the property (Ref. 12, pp.1-4).

Soil samples were collected from the areas of the building and tank foundations during the 1991 SI and the 1999 ESI (Ref. 4, p. 16; Figure 3). Analytical results from these sampling events indicated the presence of contaminants, including VOCs, PCBs, and metals, in on-site soils (Ref. 4, pp. 16-36; 7, pp. 38-58; 8, pp. 42-76; 11, p. 16; Figure 3).

Contaminated soil is not excluded as a source at the site due to the fact that contaminants not associated with petroleum products (i.e., PCBs, chlorinated solvents) were detected in soil samples collected on site (Ref. 4, pp. 16-18, 29, 32, 36).

Location of the source, with reference to a map of the site:

Areas of contaminated soil are defined by SI soil sample locations S2 through S8, and ESI soil boring Nos. 1, 3, 6, 7, 8, 12, and 13 (Ref. 4, p. 16; Figure 3). Contaminated soil areas are primarily located in the northern portion of the site near the former building and tank foundations (Ref. 4, pp. 16-36; 7, pp. 38-58; 8, pp. 42-76; Figure 3).

Containment

Release via overland migration and/or flood:

Based on the fact that there are no containment structures associated with source 2, the containment factor for the surface water migration pathway is 10 (Ref. 1, p. 51609).

2.4.1 Hazardous Substances

<u>Hazardous substance</u>	<u>Evidence</u>	<u>Reference</u>
Lead (max. = 52,300J mg/kg, S5)	SI soil samples (1991): S3, S4, S5, S6, S8	4, pp. 16, 18, 36
	ESI soil samples (1999): SS12, SS13, S12, S01 S06, S08, SS03	7, pp. 38, 40, 46-48; Figure 3
Zinc (max. = 5,550 mg/kg S5)	SI soil samples (1991): S4, S5, S6	4, pp. 16, 18, 36
	ESI soil samples (1999): S07, S08	7, pp. 47; Figure 3
PCBs (max. = 110,000E mg/kg S5, S6)	SI soil samples (1991): S4, S5, S6	4, pp. 16, 32
Tetrachloroethylene (max. = 270E ug/kg S6)	SI soil samples (1991): S2, S4, S5, S6	4, pp. 16-17, 29
1,1,1-trichloroethane (max. = 9J ug/kg S4)	SI soil samples (1991): S4	4, pp. 16, 29

Note: J or E qualifiers indicated an estimated value.

SD-Hazardous Constituent Quantity
Source No.: 2

2.4.2 Hazardous Waste Quantity

2.4.2.1.1 Hazardous Constituent Quantity

The information available is not sufficient to evaluate Tier A source hazardous waste quantity.

Hazardous Constituent Quantity Value (S): N/A

2.4.2.1.2 Hazardous Wastestream Quantity

The information available is not sufficient to evaluate Tier B source hazardous waste quantity.

Hazardous Wastestream Quantity (W): N/A

Hazardous Wastestream Quantity Assigned Value: N/A

2.4.2.1.3 Volume

Based on analytical results of soil samples collected during the SI in July 1991 and during the ESI conducted in December 1999, it is apparent that some amount of contamination is present at depth; however, the exact volume is unknown (Ref. 4, pp. 17-36; 7, pp. 38-58; 8, pp. 42-76; 11, p. 16; Figure 3). A source waste quantity of >0 will therefore be assigned.

Dimension of source (yd³): >0

Reference(s): 1, p. 51591

Volume Assigned Value: N/A

2.4.2.1.4 Area

Since the volume of the waste source can be determined, a value of 0 is given for area measurement.

Area of source (ft²): Not evaluated

Reference(s): 1, p. 51591

Area Assigned Value: 0

2.4.2.1.5 Source Hazardous Waste Quantity Value

Based on analytical results of soil samples collected during the SI in July 1991 and during the ESI conducted in December 1999, it is apparent that some amount of contamination is present at depth; however, the exact volume is unknown (Ref. 4, pp. 17-36; 7, pp. 38-58; 8, pp. 42-76; 11, p. 16; Figure 3). A source waste quantity of >0 will therefore be assigned.

Source Hazardous Waste Quantity Value: >0

SITE SUMMARY OF SOURCE DESCRIPTIONS

Source No.	Source Hazardous Waste Quantity Value	Ground Water	<u>Containment</u>		
			Surface Water	Gas	Air Particulate
1	2,018,000	NE	10	NE	NE
2	>0	NE	10	NE	NE

NE = Not Evaluated

2.4.2.2 Source Hazardous Waste Quantity Factor Value

The hazardous waste quantity factor value is determined by summing the source hazardous waste quantity values, rounding to the nearest integer, and referring to Table 2-6 of the HRS rule. The rounded sum of the hazardous waste quantity values (2,018,000) corresponds to a hazardous waste quantity factor value of 1,000,000 (Ref. 1, p. 51591).

4.1 OVERLAND/FLOOD MIGRATION COMPONENT

4.1.1.1 DEFINITION OF HAZARDOUS SUBSTANCE MIGRATION PATH FOR OVERLAND/FLOOD COMPONENT

The on-site palustrine wetland (i.e., wetland A) is believed to have been part of the former oil lake, which is being evaluated as a waste source (i.e., surface impoundment) (Ref. 6, p. 5). Runoff from this wetland A drains southeast and enters another wetland (i.e., Wetland C), which extends along the southern perimeter of the property (Ref. 4, pp. 16, 39; 9, Wetland Location Map; Figure 3). Wetland C also extends north along the western property boundary adjacent to the right-of-way, and south and west toward Frank's Creek (Ref. 9, Wetland Location Map). There are two points of entry (PPEs) to wetland C. One PPE is approximately 45 feet southwest of wetland A. The other PPE is located in Wetland C, at its most northern point, along the western property boundary near the right-of-way (Ref. 9, Wetland Location Map; 11, p. 17; Figure 3).

Sediment samples collected during the ESI in December 1999 indicate an observed release by chemical analysis to wetland C, which extends along the southern and western boundaries of the site property. Sediment samples contained lead, mercury, and zinc at concentrations significantly above the background concentrations (Ref. 7, pp. 53, 54, 56, 57). Background samples were collected from an off-site wetland which was deemed not affected by past activities at the Diamond Head Oil Refinery Div. site (Ref. 11, pp. 6, 16). Background sediment samples were collected from a wetland which had similar vegetation indicative of palustrine emergent wetlands. This wetland was similar in appearance to Wetland A and Wetland C, which are both palustrine emergent wetlands located on the Diamond Head Oil Refinery property. Background and contaminated sediment samples were similar in sediment type and percent moisture. Background samples and contaminated samples were both collected utilizing the same sampling procedures. In addition, both background and contaminated sediment samples were analyzed for TCL and TAL contaminants through the U.S. EPA Contract Laboratory Program (Ref. 15). See Figure 3 for the locations of wetland sediment samples.

The observed release indicated by sediment sample data constitutes Level II contamination of approximately 0.20 mile of wetland (Ref. 11, pp. 17). The remainder of the wetland outside of those sample locations, which has a frontage of approximately 600 feet (0.11 mile), is evaluated under potential contamination (Ref. 13). Based on the fact that there is no information to support if Wetland C is in perennial connection with Frank's Creek at this time, Wetland C is being evaluated as an isolated wetland.

4.1.2.1 LIKELIHOOD OF RELEASE

4.1.2.1.1 Observed Release

Background Concentration

<u>Sample ID</u>	<u>Sampling Location</u>	<u>Depth</u>	<u>Date</u>	<u>Reference</u>
SD01	off-site wetland	surface	12/2/99	7, p. 53
SD02	off-site wetland	surface	12/2/99	7, p. 53
SD03	off-site wetland	surface	12/2/99	7, p. 54

<u>Sample ID</u>	<u>Hazardous Substance</u>	<u>Conc (ppb)</u>	<u>Sample Quantitation Limit (ppb)*</u>	<u>Reference</u>
SD01	Lead	116 J (167.04)	1.42	7, p. 53
	Zinc	235 J (352.50)	9.46	7, p. 53
	Mercury	0.24 U	0 .008	7, p. 53
SD02	Lead	49.3	0.79	7, p. 53
	Zinc	77.2	5.27	7, p. 53
	Mercury	0.13 U	0.015	7, p. 53
SD03	Lead	98.7	0.87	7, p. 54
	Zinc	102	5.81	7, p. 54
	Mercury	0.14 U	0.014	7, p. 54

Contaminated Samples

<u>Sample ID</u>	<u>Sampling Location</u>	<u>Depth</u>	<u>Date</u>	<u>Reference</u>
SD16	wetland C	surface	12/2/99	7, p. 56
SD17	wetland C	surface	12/2/99	7, p. 56
SD18	wetland C	surface	12/2/99	7, p. 57

Contaminated Samples (cont'd)

<u>Sample ID</u>	<u>Hazardous Substance</u>	<u>Conc (ppb)</u>	<u>Sample Quantitation Limit (ppb)*</u>	<u>Reference</u>
SD16	Lead	869 J	1.24	7, p. 56
	Zinc	1,240 J	8.3	7, p. 56
	Mercury	2.9 J	0.10	7, p. 56
SD17	Lead	766 J	1.21	7, p. 56
	Zinc	1,170 J	8.1	7, p. 56
	Mercury	3.3 J	0.10	7, p. 56
SD18	Lead	552	0.93	7, p. 57
	Zinc	1,120	6.2	7, p. 57
	Mercury	2.1	0.10	7, p. 57

Note - All sediment samples were collected at 0-6 inches below ground surface (Ref. 11, p. 16).

U- not detected; number preceding U qualifier indicates detection limit.

J- Samples SD01, SD16, and SD17 were flagged with a (J) qualifier due to the fact that the percent solids for these samples were below 50 but above 10 (Ref. 7, pp. 6). Based on this information, the reported results are biased low (Ref. 14, p. 1). In accordance with the fact sheet EPA 540-F-94-028 (i.e., Using Qualified Data to Document an Observed Release and Observed Contamination), the reported concentrations for release samples were used. The concentrations for background samples are to be multiplied by the factor specified in the fact sheet, which is 1.44 for lead and 1.50 for zinc (Ref. 10, pp. 8, 18). This results in background sediment sample SD01 having a concentration of 167.04 mg/kg for lead and 352.50 mg/kg for zinc. Adjusted values for sediment sample SD01 are in parentheses in the table above

* - The Sample Quantitation Limits (SQLs) for inorganic contaminants are given in micrograms per liter(ug/l) prior to conversion.

For all metals, the following formula is used to convert the SQLs to mg/kg:

$$\{(C \times V \times F / ((1000\text{mL} \times W) \times (\% \text{ solids}/100)))\}$$

where:

C= CRDL in ug/l

V= final volume (200mL for all analytes except mercury, which is 100mL)

F= dilution factor (normally 1)

W= wet weight of sample in grams (normally 1)

Ref. No. 14

The following table lists the % solids of each sample:

<u>Sample No.</u>	<u>% Solids</u>	<u>Ref. No.</u>
SD01	42.3	7, p. 53
SD02	76.1	7, p. 53
SD03	68.8	7, p. 54
SD16	48.2	7, p. 56
SD17	49.4	7, p. 56
SD18	64.5	7, p. 57

Attribution:

Background information indicates that oily wastes were discharged directly to adjacent properties (including the wetland area in the southern portion of the site) forming the oil lake (Ref. 4, p. 5). Analytical results of the oil lake's oil layer indicated 32 percent oil and 68 percent water and sediment. In addition, the sample indicated a high lead and zinc content (Ref. 5, p. 3).

During ESI activities conducted by EPA in December 1999, petroleum odors, oil saturated soil, and free product were observed in several borings advanced in the area of the former oil lake (Ref. 11, pp. 13, 14, Figure 3). Analytical results from sediment samples collected from the on-site wetland (i.e., wetland A), which is believed to have been a part of the oil lake, indicated concentrations of lead up to 84,300J mg/kg, mercury up to 3.9 mg/kg, and zinc up to 17,700J mg/kg (Ref. 7, pp. 54, 55; Figure 3).

Inspections conducted by the New Jersey Department of Environmental Protection in the 1970s and 1980s noted discharges of oil to the surface in the area of the former building and tanks, as well as in the western property boundary adjacent to the right-of-way. Oil-stained soil was also noted in several locations throughout the property (Ref. 12, pp.1-4).

Hazardous Substances Released:

Lead
Mercury
Zinc

=====

Observed Release Factor Value: 550

4.1.4.2 WASTE CHARACTERISTICS

4.1.4.2.1 Ecosystem Toxicity/Persistence/Bioaccumulation

<u>Hazardous Substance</u>	<u>Source No.</u>	<u>Ecosystem Toxicity Factor Value</u>	<u>Persistence Factor Value***</u>	<u>Ecosystem Toxicity/Persistence Factor Value (Table 4-20)</u>	<u>Ref.</u>
Lead	1, 2	1,000	1	1,000	2, p. B-13
PCBs	1, 2	10,000	1	10,000	2, p. B-16
Zinc	1, 2	10	1	10	2, p. B-20
Mercury	1	10,000	1	10,000	2, p. B-13
PCE*	1, 2	100	1	100	2, B-18
1,1,1-TCA**	1, 2	10	1	10	2, B-19

* = Tetrachloroethylene

** = 1,1,1-trichloroethane

*** = The PPEs are into an isolated wetland. Therefore, the persistence value for lake is used to calculate the ecosystem toxicity/persistence/bioaccumulation factor value.

<u>Hazardous Substance</u>	<u>Ecosystem Toxicity/Persistence Factor Value</u>	<u>Bio-accumulation Factor Value (Section 4.1.3.2.1.2)</u>	<u>Ref. No.2, p.</u>	<u>Ecosystem Toxicity/Persistence/Bioaccum Factor Value (Table 4-21)</u>
Lead	1,000	5,000	B-13	5×10^6
PCBs	10,000	50,000	B-16	5×10^8
Zinc	10	500	B-20	5,000
Mercury	10,000	50,000	B-13	5×10^8
PCE*	100	50	B-18	5,000
1,1,1-TCA**	10	5	B-19	50

* = Tetrachloroethylene

** = 1,1,1-trichloroethane

=====

Ecosystem Toxicity/Persistence/Bioaccumulation Factor Value: 5×10^8

4.1.4.2.2 Hazardous Waste Quantity

<u>Source Number</u>	<u>Source Hazardous Waste Quantity Value (Section 2.4.2.1.5.)</u>	<u>Is source hazardous constituent quantity data complete? (yes/no)</u>
1	2,018,000	no
2	>0	no

Sum of Values: 2,018,000

The sum corresponds to a hazardous waste quantity factor value of 1,000,000 in Table 2-6 of the HRS rule (Ref. 1, p.51591).

4.1.4.2.3 Waste Characteristics Factor Category Value

Ecosystem toxicity/persistence factor value
X hazardous waste quantity factor value

$10,000 \times 1,000,000 = 1 \times 10^{10}$ (subject to a maximum value of 1×10^8)

(Ecosystem toxicity/persistence X hazardous waste quantity)
X bioaccumulation potential factor value

$(1 \times 10^8) \times 50,000 = 5 \times 10^{12}$ (subject to a maximum value of 1×10^{12})

The value exceeds the maximum of 1×10^{12} for the waste characteristics product. The corresponding waste characteristics factor category value from Table 2-7 of the HRS rule is 1,000 (Ref. 1, p. 51592).

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Hazardous Waste Quantity Factor Value: 1,000,000
Waste Characteristics Factor Category Value: 1,000

4.1.4.3 ENVIRONMENTAL THREAT - TARGETSLevel I Concentrations

N/A

Sample ID: N/A
 Sample Medium: N/A
 Location: N/A
 Reference: N/A

<u>Hazardous Substance</u>	<u>Hazardous Substance Concentration</u>	<u>Benchmark Concentration</u>	<u>Benchmark</u>
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N/A

Reference for Benchmark: N/A

Most Distant Level II Sample

Sample ID: N/A
 Distance from the probable point of entry: N/A
 Reference: N/A

<u>Hazardous Substance</u>	<u>Hazardous Substance Concentration</u>
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N/A

SWOF/Environment-Level I Concentrations

4.1.4.3.1 Sensitive Environments

4.1.4.3.1.1 Level I Concentrations

Sensitive Environments

<u>Sensitive Environment</u>	Distance from Probable Point of Entry to Nearest Point of Sensitive <u>Environment</u>	<u>Reference</u>	Sensitive Environment <u>Value(s)</u>
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N/A

Sum of Sensitive Environments Value: 0

Wetlands

<u>Wetland</u>	<u>Wetland Frontage</u>	<u>Reference</u>
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N/A

Total Wetland Frontage: N/A

Wetland Value: 0

Sum of Sensitive Environments Value + Wetland Value: 0

Ref. N/A

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Level I Concentrations Factor Value: 0

4.1.4.3.1.2 Level II ConcentrationsSensitive Environments

<u>Sensitive Environment</u>	Distance from Probable Point of Entry to Nearest Point of Sensitive Environment	<u>Reference</u>	<u>Sensitive Environment Value(s)</u>
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N/A

Sum of Sensitive Environments Value: 0

Wetlands

<u>Wetland</u>	<u>Wetland Frontage</u>	<u>Reference</u>
Wetland C (contaminated portion)	0.20 mile* Figure 3	7, pp. 53-54, 56-57; 11, p. 17

* Wetland frontage was measured starting at the eastern PPE to surface water of Wetland C, located approximately 45 feet west of Wetland A. From this point a single line measurement was made between the eastern PPE and sediment sample location SD16. This resulted in a measurement of 555 feet. In addition, a single line measurement was made from wetland C's northern PPE, located along the western boundary of the site, to sediment sample location SD16. This resulted in a measurement of 480 feet. Based on these measurements, a single line measurement of 1,035 feet (0.20 mile) of wetland C is considered the contaminated portion (Ref. 11, p. 17). To be conservative, single line measurements were made in lieu of wetted perimeter for wetland C, which is evaluated as an isolated wetland.

Total Wetland Frontage: 0.20 mile

Wetland Value: 25

Sum of Sensitive Environments Value + Wetland Value: 25

Ref. 1, p. 51625

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Level II Concentrations Factor Value: 25

4.1.4.3.1.3 Potential ContaminationSensitive Environments

Type of Surface Water Body	Sensitive Environment	Reference(s)	Sensitive Environment Value(s)
N/A			

Wetlands

Type of Surface Water Body	Wetlands Frontage	Reference(s)	Wetlands Value for Type of Surface Water Body
Wetland C (non-contaminated portion)	0.11 mile*	13	25

* The non-contaminated portion of wetland C was measured from sediment sample location SD16 to the west (along Wetland C) toward Frank's Creek. To be conservative, a single line measurement was made, resulting in a measurement of 600 feet or 0.11 mile (Ref. 13, pp. 1, 2; Figure 3).

Type of Surface Water Body	Sum of Sensitive Environment Values (S_j)	Wetland Frontage Value (W_j)	Dilution Weight (D_j)	$D_j(W_j + S_j)$
Wetland C	0	25	1	25

Sum of $D_j(W_j + S_j)$: 25
 (Sum of $D_j(W_j + S_j)$)/10: 2.5

Ref. 1, p. 51625

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Potential Contamination Factor Value: 2.5